

**ABSTRACT OF THE DISCLOSURE**

The invention provides a method for identifying a ligand that binds to a macromolecular target. The methods involve (a) attaching an antenna moiety to a first ligand, wherein the ligand binds specifically to a macromolecular target; (b) providing a sample comprising the macromolecular target, the first ligand and a candidate second ligand under conditions wherein the first ligand and the macromolecular target form a bound complex; (c) detecting a subset of magnetization transfer signals between the antenna moiety of the first ligand and the second candidate ligand, wherein the signals are obtained from an isotope edited NOESY spectrum of the sample; thereby determining that the two ligands are proximal in a bound complex, and identifying a second ligand that binds to the macromolecular target.